

# **Environmental Economics and Water Management**

By ir Michiel Wind, M.Sc.  
ECO-CONSULT ENVIRONMENTAL ECONOMICS  
- combining ecology and economics -  
web site: [www.eco-consult.nl](http://www.eco-consult.nl)

Hand-out prepared for seminar on 'Strengthening risk analysis in Czech water management', January 27-31, 2003, Wageningen, Netherlands

## **1. Valuation (in money) of environmental effects**

### Why value environment?

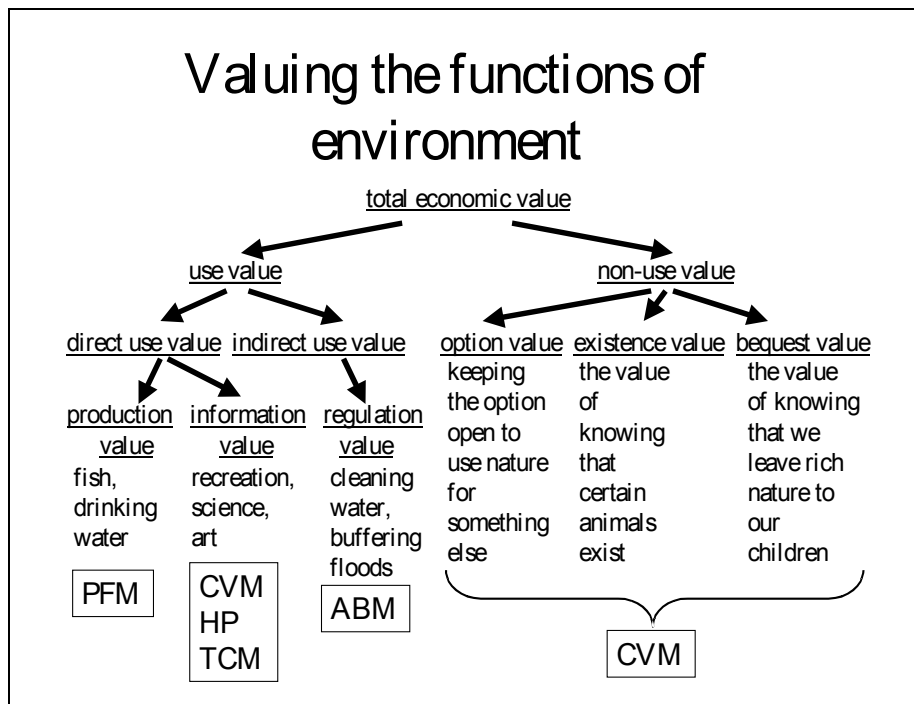
- take environmental values into account in Cost Benefit Analysis more precisely ('integration' as required by Water Framework Directive)
- take environmental values into account more consistently in different projects
- more transparent and democratic decisions
- environment has value. Universal unit for value is money, as 'kilogram' is unit of mass.

### What exactly is valuable in the environment?

Environment has a number of functions that have value:

### How (methods for valuation):

1. Contingent Valuation Method (CVM): questionnaires for willingness to pay
2. Hedonic Pricing Method (HPM): prices of houses
3. Travel Costs Method (TCM): travel expenses to enjoy nature
4. Production Factor Method (PFM): value of environmental products to companies as a input to their production, such as clean water
5. Averting Behavior Method (ABM): avoided damage costs, pollution abatement costs, costs of repairing damage to nature and the environment.



### Valuation in practice

Valuation of environmental functions is a job for experts and expensive. Therefore, thorough valuation studies are only sensible in relatively large projects where:

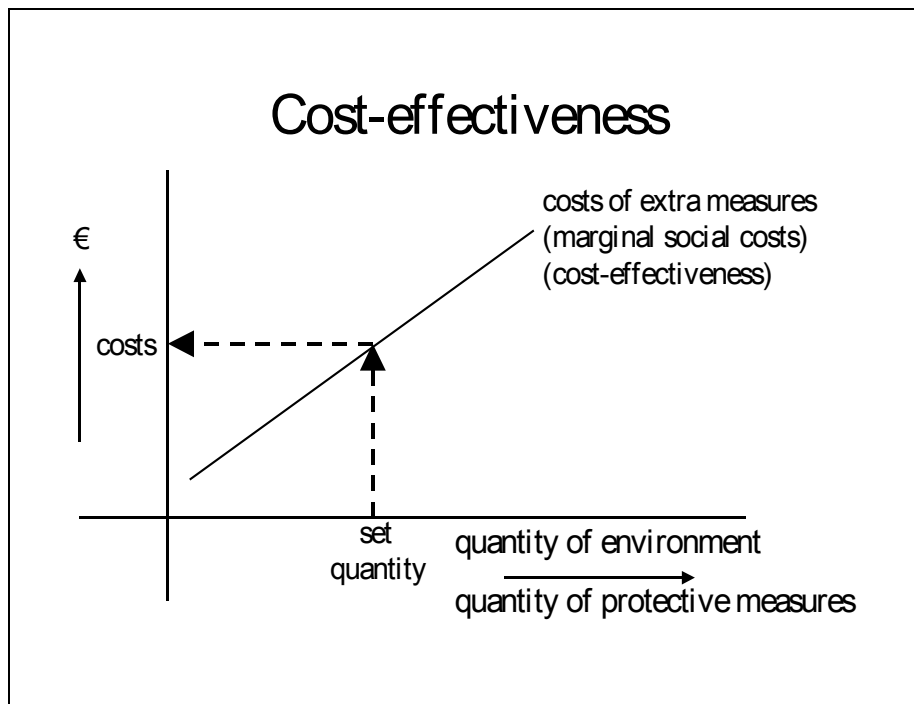
- Cost-Benefit Analyses are being done, and/or
- Environmental Impact Analyses are being done, and/or
- large (environmental) values are at stake.

Using the results of other valuation studies, so called 'benefit transfer', may be possible, but it increases uncertainty about the outcome.

Production Factor Method and Averting Behavior Method may be more easy and cheap, but may underestimate the true value of environment because they only value some of the functions (for example non-use values are not included).

Valuation methods help construct the demand function (the willingness to pay curve), so that optimal level of environment can be found. Example: this curve indicates the quantity of milk you want to buy at different prices: the cheaper, the more you want to buy. In the next slide you see how much milk/environment society wants and at what price:

In other cases, if valuation is difficult, it is best to let experts or politicians set the level of environmental protection. All we can do than is find the most cost-effective way to reach that level. Example: you have to buy a set (fixed) quantity of milk, regardless of the price, but you buy the cheapest milk first. See the next slide:



#### Summary

In any case: environment is a real value, a value that (though sometimes difficult) can be expressed in money and should be weighed against other values that have market prices. If valuation in money is difficult, the level of environment should be fixed by experts and politicians, and the costs to reach that level should be minimized by looking at cost-effectiveness.

## 2. Water Framework Directive – economic principles

#### *Marked-based policy instruments: why?*

Polluter Pays Principle (and also: cleaners and innovators cash in!) is fair, just and economically efficient. It leads to sufficiently lower pollution, and compensates victims of the pollution (society) and the money may be used to finance measures to reduce the pollution or its effects.

Golden Rule: costs and benefits should appear in prices there and than, where and when they occur.

Free markets allocate scarce resources optimally if prices are correct.

Optimal = highest possible welfare (to society as a whole) = no waste of resources.

Price = information on the value of the scarce resources that have been used to make the product.

Correct price = a price that includes not only the resources labor and material costs, but also externalities such as environment and safety. If not included, the price will be too low, too much of the product will be consumed, and welfare will reduced.

Free market with corrections for external effects (such as pollution) combines the efficiency and freedom of choice of capitalism (with decentralized decisions) with the protection of common goods of centralistic governance.

EU-principle of subsidiarity: decisions should be taken on an as low as possible level. Or: the EU should only have authority for matters that cannot be sufficiently managed at state level or lower.

*'Socialism collapsed because it did not allow prices to tell the economic truth. Capitalism may collapse because it does not allow prices to tell the ecological truth.'*  
**Øystein Dahle, Esso Norway**

*Marked-based policy instruments: how?*

Cost recovery (PPP): environment can be internalized into prices with:

- Emissions trading. For example nutrient discharges into a river basin, EC greenhouse gas trading starting 2005
- . Popular new instrument in USA and EC.
- Environmental tax (levy).
- Liability (EC-Directive) and insurance against environmental accidents.
- Deposit (as for bottles: pay a 'tax' or 'penalty' in advance for potential pollution, and get the money back if you have proven not to pollute)
- (Subsidies often conflicting with Golden Rule (PPP) and EC State Aid rules!)

*Economic analyses tools:*

1. Cost Benefit Analyses: lists relevant measures (or projects) in an order of their social profitability. **All** effects are (as far as possible) monetarized and capitalized to net present value. Discount rate is important: The Netherlands use 4%, UK 6%, Denmark 7%, France 8%, Germany 3%, and the EC uses 5%. The lower the rate, the more important future effects become in decision making and CBA. Using the same discount rate for government projects throughout the country prevents waste of resources.

2. Cost-effectiveness: lists all relevant measures in an order of their (environmental) effect per invested euro (€). This environmental effect needs not to be monetarized, but must be quantified in physical terms.

Example:

Reduction in kilos Nitrogen released into water per invested €):

Measure A: install sewage water treatment plant: 20 kilo per €

Measure B: educate farmers on more efficient use of fertilizer: 15 kilo per €

Measure C: tax farmers use of fertilizers: 15 kilo per €

Start with A, than B, and if even more reduction is necessary, also take measure C.  
Water Framework Directive: integration in river basins also means: analyze cost-effectiveness in Czechia and Germany together for the Elbe.

From the Wateco-document:

***Water services, water uses and cost-recovery***

The Water Framework Directive requires Member States to take account of the principle of recovery of the costs (including environmental and resource costs, see Article 9.1) of water services, also taking into account the *polluter pays principle*.

The assessment of cost recovery is relevant to water services (according to Article 2.(38)) but not to the wider circle of water uses (according to Article 2.(39)). However, the different water uses shall deliver an adequate contribution to the recovery of the costs of water services (Article 9.1), stressing the need to link water uses and services developed for mitigating the negative environmental impact of these uses.

***References***

- *Water Framework Directive*
- *Wateco-document 'Economics and the Environment - the implementation challenge of the Water Framework Directive'*
- *Ing. Josef Seják, expert environmental economics?, Czech Environmental Institute, [sejak@ceu.cz](mailto:sejak@ceu.cz)*

## Resume Michiel H.A. Wind

Problems and solutions on the borderline between environment and economics have special interest. Advising both the public sector, non-profit organizations and companies. Educated as a MSc in forestry at the agricultural university of Norway. Specialized in environmental economics: monetary valuation of environmental goods, market based instruments (like environmental taxes and emissions trading) and social cost-benefit analyses.

### Relevant working experience

- \* 1996 - present, **independent consultant** Eco-consult Environmental Economics; development and application of environmental economics in company management and public policy making.
- \* 1995 - 1996, **environmental policy advisor** municipality of Zwijndrecht (The Netherlands), development and co-ordination of municipal environmental policy;
- \* 1995 - 1996, **TNO-report "Milieukosten en -baten, een inleiding"**, (Environmental costs and - benefits), on some of the most important possibilities of environmental economics, written for non-economists (in Dutch);
- \* 1994 - 1997, **advisor and director on administrative and ecological affairs with** , Sicirec SA, intermediate investments in ecologically responsible teak-wood plantations in Costa Rica;
- \* 1991 - 1993, **environmental policy advisor**, ministry of Housing, Physical Planning and Environment (VROM): judgement of requests for subsidies and offers for research projects (mainly for a large project for reduction of Volatile Organic Compounds, named KWS-2000), secretary of panels of different levels of authorities and business representatives, advising and breaking in the project leader of KWS-2000;
- \* 1990 - 1991, **research assistant Environmental Economics**, Agricultural University of Norway: estimating the monetary value of environmental goods using questionnaires on willingness to pay (the Contingent Valuation Method or CVM).

### Education

- \* 1993, exam of a course in Environmental Economics at the Open University in Heerlen (The Netherlands);
- \* 1990, exam Forest engineer (MSc) at the Agricultural University of Norway, specialisation and MSc thesis on Environmental Economics;
- \* 1986, exam Forest Technician at the State Forestry School in Brandbu, Norway.

### Personal data

born: 1960  
web site: [www.eco-consult.nl](http://www.eco-consult.nl)  
phone: \* 31 35 6668753 (mobile phone: \* 31 6107 06486)  
Zevenlindenweg 5 B 43  
NL - 3744 BC Baarn  
The Netherlands